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PAPERS READ.

MYOLOGY OF CHLAMYDOSAURUS KINGII.

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[PLATES XIV.-XVI.]

The present study, if it may be so-called, of the muscles of the Frilled Lizard was suggested long ago by an incident in the Queensland bush. On one of the two occasions on which I have seen the lizard adopt its biped mode of locomotion, trotting out briskly on its hind legs, its fore-paws hanging down affectedly and its vertebral line to the very snout stiffened at an angle of 60° , I was much interested to see it halt abruptly, erect its frill, and at the same moment turn its head enquiringly from side to side—then trot on again for twenty yards or so, and repeat its attitude of attention—thus it did, till it reached the tree it was making for, then darting a few feet up its bole it clung there immovable for more hours than my leisure could afford for

observation. The listening attitude assumed by the pedestrian reptile, if the phrase may be excused, was so real, or at least so realistic, that it at once occurred to me that one function of the hood might be that of conducting sound to the tympanum, an office apparently aided by the channels formed by its converging folds, and that if it were so it might be furnished with special muscles. After this point had been investigated it was a *facilis descensus* to the nether extremities, where nature might be asked if she had made any peculiar muscular provision for erect carriage; and when this question had been put so few of the creatures muscles remained intact, that it seemed well to examine the rest and render an account of the whole myology of a lizard, which is really inferior to few in interest. I do not propose to lengthen the following descriptions with references to the muscles of whatever lizards may have been previously examined, but to form them as tersely as possible. At some future time an opportunity may be taken of comparing the myology of some other of our Australian lacertians, not only with that of the subject of the present observations, but with that of all the extraneous lizards which have been monographed or otherwise noticed.

MUSCLES OF THE UNDER SURFACE OF THE HEAD.

Mylohyoid (Plate XIV., fig. 1—m. h.)—At its commencement very near the symphysis menti it is thick and attached to the lower edge of the mandible, its fibres passing transversely from each side to a median raphe; as it recedes from the symphysis it becomes gradually thinner, its insertion rises higher on the inner surface of the jaw, and the course of its fibres is more and more oblique till it merges into the

Platysma myoides (fig. 1—p. m.) which sends attenuated fibres and slips to the gular region of the hood, and is lost dorsad in the fascia covering the trapezius, but acquires thickness over the sternum and cervix.

Thyromandibularis (fig. 1—t. m.)—Two distinct muscles may bear this name, an externus and an internus. The latter rises by two slips from about the middle of the inner surface of the mandible

and is inserted into the middle of the inner side of the thyrohyal. The greatly elongated thyrohyal passes between the two layers of integument constituting the hood, at its middle fold, and so forms a "yard" to which the lower half of the hood is bent. This inner division of the Thyromandibularis being an adductor of the bone, is the chief agent in lowering the hood and bracing its lower moiety to the side of the neck—it is antagonised by the greater part of the outer division which rises fleshy immediately behind the inner one, but nearly on the lower edge of the jaw, the origin of the mylohyoideus being between them. It immediately divides into two superposed fascicles, the deeper one being inserted into the lower surface of the thyrohyal a little behind the insertion of the inner division—the other sub-division is inserted posteriorly to the former one into the outer side of the bone for the rest of its length, and acting thus advantageously is an efficient erector of the lower part of the hood.

Geniohyoideus (fig. 1—g. h.)—Partly concealed by the preceding rises as a fleshy cone from the symphysis, and expanding as it recedes, is inserted into the inner side of the base of the thyrohyal.

Ceratomandibular (fig. 1—c. m.)—Rises by a double headed origin from the inner side of the mandible below the thyromandibularis—and is inserted into the whole of the outer side of the cerato-hyal to its extremity.

Glossohyoideus.—From the mandible, between the symphysis and the insertion of the thyromandibularis—from the median raphe—the outer edge of the under surface of the tongue, the side of the basi-hyal and strongly from the hinder end of the base of the tongue—inserted into the outer side of the proximal portion of the thyrohyal as far backward as the insertion of the outer division of the thyromandibularis—a powerful divaricator of the thyrohyals and consequent erector of the hood.

Hyobranchialis (fig. 1, h. b.)—From the hinder edge of the arm of the ceratohyal to the whole of the inner edge of the thyrohyal beneath the glossohyoideus—the deepest of the muscles concerned in the erection of the frill.

MUSCLES OF THE UPPER SURFACE OF THE HEAD.

Digastric (fig. 2-d.)—In two very distinct and subequal bodies. The external from the edge and posterior sloping surface of the postfrontal:—passing the fibro-cartilaginous root of Grey's cartilage of the hood its outer fibres have a strong insertion into the hinder part of the root of the cartilage; it is thence continued to form the posterior portion of its joint insertion into the extremity of the inner surface of the long articular process of the mandible. By virtue of its insertion into the cartilage it becomes the chief erector of the upper half of the hood. The internal body rises from the parietal process, and converging to the external near their joint insertion forms the posterior half of that insertion.

Attollens chlamydis (fig. 2—atc.).—A thin triangular muscle rising from the posterior half of the edge of the postfrontal external to the digastric and inserted into the fore part of the lower angle of Grey's cartilage.

Adductor chlamydis (fig. 2—a. c.).—A very distinct band rising over the occipital condyle from the ligamentum nuchæ and fascia of the complexus major in apposition to its fellow of the opposite side; running outward and downward within a conspicuous fold of the integument of the hood it reaches Grey's cartilage, and is inserted into it at about the middle of its lower side. Its function seems to be to draw the erect hood downward and inward upon the neck.

Pterygoideus externus.—From the sloping posterior external surface, rotular anterior edge and adjacent inner surface of the articular process;—inserted mainly by strong tendon into the entopterygoid process, also into the edge of the entopterygoid as far as its exterior process.

Pterygoideus internus.—From the posterointernal surface of the articular process nearly to the coronoid process;—inserted into the edge and surface of the entopterygoid.

Temporalis (fig. 2 t.)—From the whole fossa—*i.e.*, from the outer side of the tympanic, columella, and parietal process; inserted into the coronoid process and edge of the surangular element.

The preceding three muscles are but moderately developed.

Zygomaticus (fig. 2—z.)—A thin but very distinct muscle rises from the curved posterior edge of the malar, and rests upon the anterior portion of the temporalis. It is inserted by two attachments into the outer and inner sides of the commissure of the lips. Its office being clearly to raise the commissure, I venture to recognise it as a zygomaticus major, and very unexpected the recognition is.

MUSCLES OF THE NECK AND THROAT.

Complexus major.—From the spines of the anterior two dorsal and transverse processes of the posterior cervical vertebræ;—inserted as usual into the supraoccipital and parietal process.

Complexus minor.—From the transverse processes of the cervical vertebræ; inserted by two equal divisions separable for some distance from their points of attachment into the parotic ridge and into the occipito-parotic process beneath the insertion of the sternocleidomastoidens.

Rectus capitis posticus major.—Under the circumstances I was rather surprised that no trace of this muscle was discoverable.

Spinalis colli.—Lying between the spines and transverse processes of the cervical vertebræ beneath the complexus major; inserted beneath the complexi into the supraoccipital and parietal.

Sterno(cleido)mastoideus (fig. 1—s. c. m.).—A very narrow ribbon running obliquely from the foremost point of the true sternum to its insertion into the occipito-mastoid process.

Omohyoid (fig. 1—o. h.).—A powerful muscle rising from the middle third of the anterior edge of the clavicle; also by a narrow slip from the sternum below (ventrad of) the preceding, and joining the main body at about the middle of its length. Its insertion is into the proximal third of the lower edge of the inner side of the thyrohyal.

Sternohyoid (fig. 1—s. h.).—Has a bulky origin from the sternum immediately superposed by the omohyoid, and from the strong fascia investing the pectoralis major. It expands and thins away as it proceeds to the inner side of the thyrohyal beneath the

omohyoid. Its anterior fibres are inserted near the lower edge, its posterior ones gradually ascend towards the upper edge of the bone.

Rectus capitis anticus major.—Rises by tendon from the basioccipital process; also from the hinder edge of the lower surface of the bone;—inserted into the upper part of the under surface of the third and fourth ribs, and sides of the bodies of the posterior cervical vertebræ.

Longus colli.—From the ventral surfaces of the atlas and axis and posterior cervical vertebræ; inserted into the summit of the first and second ribs, and thence continued to be inserted with the rectus anticus.

Scalenus.—Unusually small; rising from the transverse process of the fifth cervical vetebra it is inserted into the fore edge of the first (cervical) rib.

Cervicalis ascendens.—An indefinable continuation of the sacrolumbalis. It may be said to be inserted into the three anterior ribs, the three posterior cervical vertebræ and rather strongly into the deep surface of the levator scapulæ near its origin.

MUSCLES OF THE SHOULDER—GIRDLE AND FORE LIMB.

Pectoralis major (fig. 3—p. m.).—From the last sternal rib, and the middle line of the sternum to the base of the clavicle, but not from the interclavicle; inserted into the summit of the radial tuberosity of the humerus.

Pectoralis minor.—Not represented.

Trapezius.—Rises by a thin, strong aponeurosis from the eighth rib; anteriorly its aponeurosis becomes continuous with the nuchal fascia. Inserted by a broad tendon into the outer side of the edge of the anterior angle of the scapula.

Deltoid (fig. 3—d.).—In two divisions. The first from the base of the suprascapula and summit of the scapula, and from the ligamentous sepiment between it and the latissimus dorsi over the subscapularis. The second from the whole posterior edge of the clavicle. The common insertion is into the outer side of the summit of the radial tuberosity of the humerus.

Epicoracohumeralis.—From the bifurcation of the epicoracoid from the fenestra, and from the adjacent edge of the coracohumeral;—inserted into the apex of the radial tuberosity between the deltoid and pectoralis major.

Infraspinatus.—From the spinous process of the scapula: by a distinct slip from the upper spur of the epicoracoid and from the membrane between them—the combined body also derives origin, but rather scantily, from the subjacent bone nearly to the glenoid cavity. Passing between the two long heads of the triceps and its external humeral origin, and beneath the ligamentous strap connecting the second long head of the triceps with the head of the humerus, it is inserted between the humeral heads of the triceps.

Triceps (Plate XIV., fig. 3, and Plate XV., fig. 4—t.)—1st. External long head, from the posterior edge of the base of the scapula (fig. 4—T. 1.)

2nd. Internal long head, on the left side rises from the same spot ventrad of the external: on the right side rises from the articular ligament. This head receives a long slender tendon from the ligamentous arch beneath the subscapularis. (fig 4—T. 2.)

3rd. External humeral, from the whole posteroexternal surface of the humerus;—externally communicating with the

4th. Internal humeral, from the internal surface of the humerus as far as the head.

The common insertion is into the patelloid ossicle and summit of the ulna.

Brachialis anticus (fig. 3 & 4—b. a.)—From beneath the radial tuberosity and downwards;—at less than two-thirds of the length of the bone it blends indissolubly with the biceps.

Biceps (Plate XIV., fig. 3, and Plate XV., fig. 4—b.)—1st. Head rises—by a broad tendon (without any interruption) from the anterior sternal margin of the coracoid.

2nd. Head—rises by a fleshy belly from the lower epicoracoid spur and edge of the fenestra;—at about half its independent course this belly becomes a tendon, and again becomes fleshy before joining the first head. Inserted in common with the *Brachialis anticus* into which it quickly merges.

Coraco brachialis.—*C. brevis*.—The short portion rises from the lower two-thirds of the posterior surface of the epicoracoid, and from the internal surface of the head of the humerus ;— it is inserted into the proximal half of the fore edge of the humerus. *C. longus*. The long portion rises from the lower (sternal) edge of the common origin, and is inserted into the inner condyle.

Levator scapulae.—From the aponeurosis covering the side of the neck, and from the pleurapophyses of the atlas and three succeeding vertebræ. It expands as it passes backwards to its insertion, which is separable into two parts, a lower or ventral one beneath the upper part of the origin of the sternohyoid, and a dorsal one into the upper interior angle of the suprascapula and the edge of the scapula. The two portions may be separated for some distance ere they join.

Latissimus dorsi.—From the fourth, fifth, and sixth dorsal vertebræ, and thence to the last true rib ;—inserted into the short ridge on the posterior external surface of the humerus below the head,

Costocoracoid.—A very feeble muscle from the anterior edge of the first sternal rib ;—inserted into the sternocoracoid ligament going from the posterior upper of the sternum to the bottom of the epicoracoidal fork.

Sternocostalis.—A thin sheet from the same point of the sternum to the anterior edge of the third sternal rib.

Serratus.—1st. From the distal moiety of the fourth and fifth sternal ribs and posterior edge of the third, along which it exchanges fibres with the second portion beneath ; inserted into upper part of the hinder edge of the scapula, extending a little around the upper angle.

2nd. From the lower end of the third vertebral rib beneath the first portion ; inserted into the middle of the hinder margin of the scapula below the first portion,

3rd. Small, from the back of the upper part of the third rib ; inserted into the lower surface of the hinder upper angle of the suprascapula.

4th. Much larger, from the upper part of the second and first rib; inserted into the upper half of the under surface of the suprascapula.

Subscapularis.—From the whole deep surface of the scapula, coracoid and epicoracoid; inserted into the ulnar tuberosity of the humerus.

Coracohumeralis.—(=External sterno-coracoid of Mivart, P.Z.S. 1867-779). From the whole deep surface of the coracoid and epicoracoid; its fibres converging are inserted strongly into the ulnar tuberosity beneath the insertion of the subscapularis.

Sternocoracoid.—From the articulations of all the sternal ribs with the sternum;—meeting its fellow of the opposite side at the posterior end of the sternum, but diverging from it anteriorly to be inserted by a long tendon into the deep surface of the lower (posterior) spur of the epicoracoid, passing beneath the edge of the coracohumeralis on the one side, over it on the other.

Pronator teres.—Rises by a moderate tendon from the summit of the olecranon; passing over to the supinator longus it becomes confluent with it.

Supinator longus (fig. 4—s. 1.).—Rises by a single head from the outer condyle;—inserted into the radial edge of the lower half of the radius

Pronator brevis.—From the fore part of the inner condyle; insertion into the second fourth of the radius.

Supinator brevis.—From the hinder part of the inner condyle, insertion into the upper third of the ulna.

Pronator quadratus.—From the flexor surface of the lower (distal) half of the ulna into the flexor surface of the radius. At its upper end wedged in between the pronator brevis and supinator brevis.

Flexor sublimis digitorum.—Has the normal lacertian origin from the annular ligament; its perforated digitations are inserted each into the base of the first phalanx of the digit.

Flexor carpi ulnaris (fig. 4—f. u.)—First head tendinous from the olecranon and soon coalescing with the extensor carpi ulnaris. Second or condylar head from the inner condyle forming a round fusiform belly entirely separable from the first. The common insertion is carneotendinous into the ulnar side of the common tendon of the flexor profundus.

Flexor profundus digitorum (fig. 3—f. p. d.)—The two condylar heads of this muscle are separable, but with difficulty. They quickly blend with the ulnar head, and in the large tendon common to them is a sesamoid. The fourth or deep head rises fleshy from the carpus, and is inserted into each tendon. The great tendon runs up within the muscle as a rather stiff tongue, reminding one of the semiossified tendons of birds.

Extensor carpi ulnaris.—Rises tendinous from the outer condyle; soon becoming confluent with the olecranal division of the Flex. c. u. is inserted into the pisiform and fifth metacarpal.

Extensor carpi radialis (fig. 4—e. r.)—Tendinous from the outer and hinder part of the outer condyle;—besides its three tendons to the second, third, and fourth metatarsals, it sends a fleshy slip to the fascia over the fifth.

Extensor ossis metacarpi pollicis.—From the distal third of the ulna;—inserted into the metacarpal of the pollex.

Extensor proprius pollicis.—This is a thin band running on the distal edge of the preceding from the ulna across to the pollex, where it forms a tendon which proceeds along its upper surface to the unguis phalanx.

Extensor communis.—Feeble; rising from the carpus, forms a muscular pad hardly resolvable into distinct fascicles except at their insertions into the bases of the digits.

Adductor minimi digiti.—Distinct though small;—rising by a long tendon from the metacarpal of the pollex;—inserted fleshy into the distal end and radial side of the metacarpal of the fifth digit.

Interossei. 1st, *Flexor brevis*.—Large, fanlike ;—rising from the carpus and going in pairs of fascicles to each side of the three middle digits. 2nd. A similar pair of very feeble insertions into the fifth digit. 3rd. *Opponens pollicis*, a single fascicle from the ulnar side of the index to the ulnar side of the pollex. 4th. *Flexor brevis pollicis*—A fascicle with direct course from the carpus to the ulnar side of the pollex.

Interossei dorsales.—From the carpus to each side of each digit save the pollex. The fascicle mentioned by Mr. Mivart as inserted into the metacarpal of the pollex appears to be substituted by the extensor proprius pollicis.

MUSCLES OF THE PELVIS AND HIND LIMB.

Sartor-gracilis (fig. 5—s. g.)—The broad and thin muscle traversing the inner (ventral) side of the lacertian thigh obliquely and superficially, occupying the place and performing the functions of the sartorius and gracilis has been named both the one and the other. In the present subject at least, it seems to me to be a combination of the two and to deserve the compound name. It rises from the ischium, and the arched ligament connecting the ischium with the spine of the pubis. It has no origin from the ischiatic symphysis. Its tendon is inserted into the ridge on the back of the tibial side of the tibia, at the lower end of the internal lateral ligament where it covers the tendon of the semitendinosus whose insertion is in union with it. The sartorius is represented by the upper and major part of the muscle, the gracilis by the inferior fibres which about the middle of their length separate from the rest, and send a slender tendon to be inserted just below that of the chief division, distinct from it, but communicating with it by a minute belly and delicate tendon.

Semitendinosus (fig. 5—s. t.)—From the ligament joining the posterior point of the ilium with the tuberosity of the ischium, in close proximity to the origin of the biceps ;—inserted as the deep part of the sartor—gracilis tendon.

Biceps (fig. 6—b. f.)—Rises ventrad and contiguously to the last. Behind the knee it forms two tendons. One passes down the inner edge of the gastrocnemius internus with which it is incorporated, the other passes forwards between the heads of the gastrocnemii, and of the tibia and fibula, and is inserted into the front of the tibia immediately below the head.

Semimembranosus (fig. 6—s. m.)—Rises a little apart from and ventrad of the biceps, passes behind the tendon of the femoro caudal, and quickly divides into two portions:—

1st. Its tendon passes beneath the internal lateral ligament to be inserted into the summit of the inner side of the tibia.

2nd. Receives the tendon of the tibial adductor, and with it is inserted into the summit of the outer side of the tibia. Along its anterior edge runs the long tendon of the femoro caudal.

Adductor tibialis (Plate XVI., fig. 9—s.)—A compressed muscle wedged in between the rectus and adductor magnus;—it rises from the acetabulo—pubic ligament anterior to the origin of the gracilis—it is inserted with the first division of the semimembranosus.

Adductor magnus (fig. 9—a.)—Rises from the ischiopubic ligament immediately below the gracilis. It is inserted into the whole length of the posterior surface of the femur flanked distad by the vastus externus and internus;—the inner (femoral) portion of the distal end is separable as a small flat belly.

Vastus externus (Plate xv., fig. 6—v. ex.)—Rather large, rises from the proximal third of the femur, and at the middle blends indissolubly with the cruræus.

Vastus internus (fig. 5—v. i.)—Much smaller, from the inner side of the humerus at about its middle, and merging below into the extensor mass.

Ilioperoneal (fig. 6—i. p.)—Semitendinous from the middle of the inferior border of the ilium, not overlapping the glutæus medius; inserted by strong tendon into the outer side of the head of the femur between the outer head of the gastrocnemius externus and the peronæus primus.

Rectus femoris (fig 5—r. f.)—Tendinous from the brim of the acetabulum, passes beneath the origin of the adductor tibialis at the proximal third of its length, is joined by a long slip rising tendinous from the iliopubic spine below the origin of the glutæus maximus, and is inserted into the patella, in common with the cruræus.

Glutæus maximus (fig. 5 & 6—g. mx.)—Rising from a thin strong tendinous fascia attached to the ilio-pubic ligament, it is bound down posteriorly by tendinous fibres to the ilioischiatric ligament arching over the passage of the femoro caudal tendon : and fuses with the cruræus midway on its anterior surface, and lower down on its outer lateral side.

Glutæus medius (fig. 5—m. a.)—From the inferior outer border of the ilium passing from under the origin of the maximus ;—inserted into the proximal third of the posterior surface of the femur behind the origin of the cruræus.

Femoro-caudal (fig. 9—f. c.)—A strong muscular sheet from the lower side of the proximal fourth of the tail ;—inserted by a broad strong tendon into a low ridge or row of tubercles at the outer base of the trochanter : reflexing and rotating the femur. From the lower side of its tendon near insertion, a long slender tendon, sent down the biceps, runs to the interarticular cartilage beneath the popliteal space, and is there inserted.

Pyriiformis (fig. 7—p. f.)—From the lower surface of the first three transverse processes of caudal vertebræ ; inserted into the iliopubic ligament, and thence into the trochanter immediately external to the tendon of the femorocaudal. A minute belly rising from the ischiatic tubercle, and inserted by tendon into the side of the head of the femur appears to be an accessory slip.

Pectineus.—In three divisions. The first a small fusiform belly rising in front of the pubic spine, and going to the lower part of the trochanter ridge superficial to the second, which is a larger fascicle from the pubic spine into the same ridge immediately above it. The third is from the concavity formed by the reflected lip of the pubis, and goes to the same insertion in union with the previous one.

Obturator externus.—From the ischium and obturator membrane, in continuity with the last; inserted into the trochanteric fossa higher than the insertion of the pyriformis.

Obturator internus.—Possibly represented by the slip referred to the pyriformis with which it may have no real connection.

Iliacus primus.—A long flat band from the median raphe on the deep surface of the pubis; it passes over the brim of the pelvis close by the pubic spine receiving fleshy fibres from the brim in its passage and is inserted into the acetabulo-ischiatric ligament.

Secundus (fig. 7—i. 2)—A long thin muscle rising also from the median raphe, and passing dorsad of the primus over the pelvic brim.

Tertius (fig. 7—i. 3)—Broad and strong from the whole deep surface of the pubis and ischium. It passes over the brim of the pelvis between the two heads of the rectus, and is inserted into the second upper fourth of the femur, becoming also continuous with the origin of the vastus externus. On the left side however, it has no connection with the vastus, but sends fibres to the cruralis from its lower transverse edge.

Gastrocnemius internus (fig. 9 & 10—g. i.)—From the whole length of the inner condyle of the femur between the tendons of the sartor—gracilis and inner semimembranosus, and of the biceps. Its outer edge is strengthened by the long tendon of the biceps. It forms the superficial plantar fascia, strengthening the tendons of the gastrocnemius externus.

Gastrocnemius externus (fig. 9 & 10—g. e.)—Rises together with the plantaris from the outer femoral condyle above the outer semimembranosus, and the peronæus primus. As it passes over the flexor profundus it communicates fibres to it in one leg but not in the other. In its distal portion, its line of junction with the plantaris is obvious, but the two are still inseparably blended. It is inserted as part of the

Plantaris (fig. 10—p. 1.)—Which, rising in union with the preceding, has three insertions, First or fibular division;—its tendon splits into unequal parts, whereof the first receives a tendon from

the tibial lumbricalis, and running along the tibial edge of the lower surface of the third toe is inserted into the base of the penultimate phalanx.

Second or median ;—gives off a perforated tendon which, after receiving the tendon of an accessory rising from the deep surface of the perforans, re-unites, and is inserted into the tibial side of the base of the penultimate phalanx of the first toe.

Third or tibial division. The tendon is perforated, and embracing the perforans is inserted on either side of the base of the penultimate phalanx of the hallux.

Flexor longus (fig. 7—f. l. d.)—Fleshy from the outer femoral condyle between the tendinous origins of the glutæus externus and peronæus primus, and fleshy from the middle third of the fibula; its tendon when splitting up on the sole receives the whole of the tibial division of the plantar accessory. It has beneath each tendon a flat fleshy belly which rises immediately after its separation; these bellies are attached fleshy to the base of the proximal phalanx of the second and fourth toes; the flexor tendons go to the last phalanx of each of the five digits. The outer or fibular tendon passes under the edge of the outer (second) division of the lumbricales; receives the equal sized tendon of the outer division of the plantar accessory, and proceeds to the base of the terminal phalanx of the fifth digit.

Peronæus primus (fig. 7—p. 1.)—By thin tendon from the outer femoral condyle and a strong carneotendinous origin from the head of the fibula; inserted by a strong round tendon which runs in a synovial sheath in a groove at the back of the outer malleolus, and is inserted into the outer edge of the fifth metatarsal.

Peronæus secundus (fig. 7—p. 2.)—From the anterior outer aspect of the fibula nearly throughout; inserted by a strong tendon into the fifth metatarsal proximad of the primus.

Tibialis anticus (fig. 7—t. a.)—Fleshy from the lower four-fifths of the tibia; the upper portion is more on the outer, the lower more on the inner aspect of the front of the bone; inserted by a broad thin tendon, given off by its fore edge, into the proximal third of the metatarsal of the hallux.

Extensor longus (fig. 7—e. l. d.)—Tendinous from the outer side of the fore aspect of the head of the tibia;—forms a slender muscle dividing its tendon over the base of the middle metatarsal. Each tendon passes between the metatarsals to the plantar surface of the middle one, and runs forward beneath it to an insertion at about three-fourths of its length. In the other foot the tendon *undivided* passes down the peroneal side of the metatarsal.

Extensor brevis (fig. 7—e. b. d.)—1st. From the peronæal side of the lower end of the fibula passes obliquely as a broad slip to the dorsum of the hallux.

2nd. Rises inseparably from No. 1;—inserted into the dorsum of the index. In the other foot this rises by tendon from the upper fibular side of the base of the first (hallux) metatarsal.

3rd. By a strong tendon from a depression in the middle of the upper surface of the astragalus;—insertion into the dorsum of the third digit.

4th. From the base of the fourth metatarsal;—inserted into the dorsum.

5th. By a strong tendon from the inner side of the outer tuberosity of the calcaneum;—it passes without adhesion over the dorsum of the fourth metacarpal, and is inserted into the base of the proximal phalanx.

6th. *Extensor proprius quarti digiti*.—Fleshy from the fibular side of the base of the fourth metatarsal;—sends a long tendon to the upper and outer side of its terminal phalanx.

Extensor accessorius.—Two fascicles rising together from the outer side of the anterior tuberosity of the calcaneum send a long tendon along the outer side of each of the third and fourth digits to the terminal phalanges.

Popliteus (fig. 7—p. p.)—From the tibial side of the head of the fibula; inserted into the posterior side of the upper fourth of the tibia.

Tibialis posticus (fig. 7—t. p.)—From the lower two thirds of the hinder surface of the fibula; ends in a carneotendinous expansion investing the ends of the tibia and fibula.

Peroneo-tibialis (fig. 7—ptb.)—A small pronating muscle descending from about the lowest fifth of the fibula to the tibia ; on to the anterior surface of which it is inserted.

Supinator pedis.—A delicate band rising beneath the tibialis posticus fleshy from the posterior side of the fibula ; inserted by tendon into the middle of the outer side of the outer malleolus.

Lumbricales (fig. 9—l. 1 & 2).—Are merely two small bundles rising from the third and fourth perforating tendons. The smaller is inserted on the inner side of the third tendon. The larger and fibular division sends a slender tendon with the perforans to the tibial side of the base of the penultimate phalanx of the fourth toe.

Flexor accessorius (fig. 9—f. a. 1).—In three divisions—

1st. (fig. 9—f. a. 1).—Rises from the os calcis, and is inserted into the flexor longus tendon on its peroneal side before it splits up on the sole.

2nd. (Plate XVI., fig. 9—f. a. 2).—From the inner and concave surface of the fifth metatarsal nearly to its distal end. Beneath it proximad runs the tendon of No. 1, and beside it lies the belly of the flexor minimi digiti ; its insertion is into the tendons of the digits from the second to the fourth.

3rd. (fig. 9—f. a. 3).—By a long round tendon from the external lower angle of the os calcis ; resting on the concave surface of the metatarsal it winds round inwardly and downwards to the inner side of the fifth metatarsal.

Flexor minimi digiti.—Rises above the No. 2 preceding, on the tibial aspect of the ridge of the metatarsal, and is inserted by tendon into the tibial side of the base of the first phalanx.

Abductor hallucis.—Rises from the cuboid, and is inserted into the first phalanx of the hallux.

Abductor metatarsi quinti.—Rises by a short stout semi-tendinous origin from the distal end of the calcaneum, and is inserted fleshy into the distal tuberosity of the deep surface of the fifth metatarsal.

Transversales plantæ consist of—

1st. A flat belly from the upper edge of the inner side of the fifth metatarsal under the accessory flexor No. 2. It crosses the sole and is inserted into the outer (fibular) side of the base of the first phalanx of the hallux.

2nd. Rises by tendon, distad of the preceding, and dividing into two flat bellies, is inserted into the second and third toe.

There is no branch of this superficial layer to the fourth toe.

Interossei.—These are in three sets, connecting the toes from the hallux to the fourth.

MUSCLES OF THE TRUNK AND TAIL.

Longissimus dorsi.—Chiefly a continuation of the upper lateral columns of the caudal system. It has also a strong tendinous origin from the posterior process of the ilium. It is inserted into the dorsal spines with frequent alternations of origin and insertion: laterally it is indistinguishably blended with the sacro lumbalis.

Sacro lumbalis.—Rises from the anterior part of the crest of the ilium, and is inserted by tendinous interdigitations into the ribs till it merges into the cervicalis ascendens.

Rectus abdominis.—From the posterior end of the ischiatic symphysis. Occupying as usual the middle tract of the abdomen, on its lateral edge it blends with the external oblique. It is inserted into the last two ribs, posterior to but distinct from the pectoralis major.

External oblique.—Separable into three more or less stratified divisions.

1st. From the third rib ventrad of the origin of the first portion of the serratus, and from the two following ribs; inserted into the rectus.

2nd. From the first three floating ribs, this layer terminates anteriorly in aponeurosis and blends posteriorly with No. 1.

3rd. From the last rib and lumbar fascia; it has a strong insertion into the pubic spine, and by virtue of its lumbar connection into the anterior process of the ilium.

Internal oblique.—Lines almost the entire chest; rising from all the vertebral, and inserted into all the sternal ribs by digitations, and into the rectus by continuity.

Transversalis.—From a fascia extending from the pelvis to the ribs; from this long origin it runs to be inserted into the rectus and sternum.

Intercostales externi.—Run obliquely between all the ribs both vertebral and sternal.

Intercostales interni—Between the sternal ribs only: but on the upper half of the vertebral ribs the deep fibres of the externi are more or less separable as an internal layer

Retrahentes costarum from the ventral surface of the vertebræ adjacent to the head of each rib forwards to the fourth. The broad and delicate posterior digitations pass beneath two ribs to be inserted into the third in advance. The first two are more distinct, especially the first which rises at the fourth rib, and is inserted by a rather long tendon into the second.

Caudalis (Plate XVI., figs. 12 & 13—f.c.)—Consists of four rows of cone-in-cone muscles, one on each side of the upper and lower surfaces. Posteriorly these columns occupy the spaces between the spines and hæmapophyses and transverse processes. Towards the base of the tail the columns separate from the vertebræ and form an investing layer over the origins of the pyriformis, femorocaudal and compressor cloacæ. The upper lateral column is an extension backwards of the longissimus dorsi. The upper median is a similar extension of the sacrolumbalis, but it has also a special origin by tendon from the spine of the ilium. From this origin a long round fascicle enclosed in a sheath formed of the rest of the muscle beneath runs backward to a point at the eleventh caudal vertebra. The lower median rises in conjunction with the lower lateral from the transverse processes of the first and succeeding caudal vertebræ. Expanding, they join their fellows of the opposite side on the basal median line, overlapping as they descend the origin of the pyriformis. By their separation they form the lower median and the lower lateral columns.

Compressor cloacæ (fig. 13—c. c.)—Rises by two heads; one from the transverse processes of the fifth and sixth caudal vertebræ, the other from the processes of the seventh and ninth; they descend side by side over the femoro-caudal and lower lateral caudal column, and are inserted into the side of the cloacal outlet.

Sphincter cloacæ.—Composed of transverse fibres on the posterior aspect of the cloaca.

Transversus peronei (fig. 13—t. p.)—A strong mass rising from the epischiatric ossicle, inserted into the ileoischiatric ligament contiguous to the insertion of the semimembranosus.

OBSERVATIONS.

The result of the examination, is on the whole somewhat disappointing. The fact ascertained that the mechanism of the frill is served by special though feeble muscles, as well as by a large extension of the functions of some ordinary ones, is nothing surprising to an eye witness of its use. Our knowledge of that use has not been much advanced. The muscles specialised for the purpose of assisting in the elevation and depression of the hood do not of themselves indicate very clearly that the appendage is in a strict sense an auditory conch. But since they certainly do not forbid the idea generated by the presence of the cartilage and by the observed actions of the animal, that the hood may serve to arrest sound and direct it towards the ear, we may, if we can overcome our disinclination to attribute an auricle to a reptile, recognise this as part of its office without prejudice to its supposed use as an engine of terror to assailants. With this conclusion, we must for the present rest content. Still less satisfaction in the way of discovery has been derived from the second division of the enquiry. We may fairly be allowed an expression of surprise on finding that the semierect attitude and plantigrade gait of the creature are not facilitated by any additions or modifications in the hind quarters and limbs. Thus it is, however;—all is strictly lacertine. There is no approach towards the conditions existing in warm blooded bipeds. The so-called glutæi for instance, are still in front of the

thigh;—the whole work of raising the body is thrown disadvantageously upon the long muscles of the back of the thigh. The possibility of raising the body on the legs is rather permitted by circumstances generally favourable than brought about by direct means. It is in the comparative shortness and lightness of the head and anterior part of the trunk: the length without undue weakness of the hind limb: above all, as it appears to me, in the imperfect isolation of the several muscles which enables them to act in certain directions with combined strength that we must find an explanation of the power possessed by this lizard of simulating the gait of a cursorial bird; certain it is that in its muscular system it has no feature relating it to anything higher than its fellow reptiles.

DESCRIPTIONS OF AUSTRALIAN MICRO-LEPIDOPTERA.

BY E. MEYRICK, B.A.

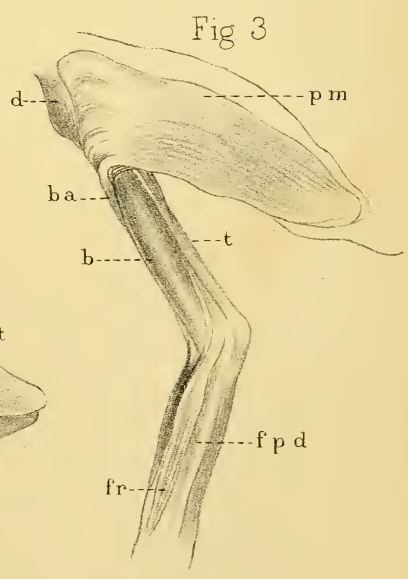
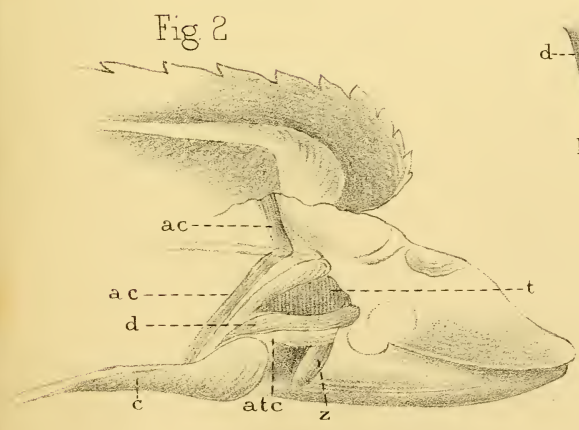
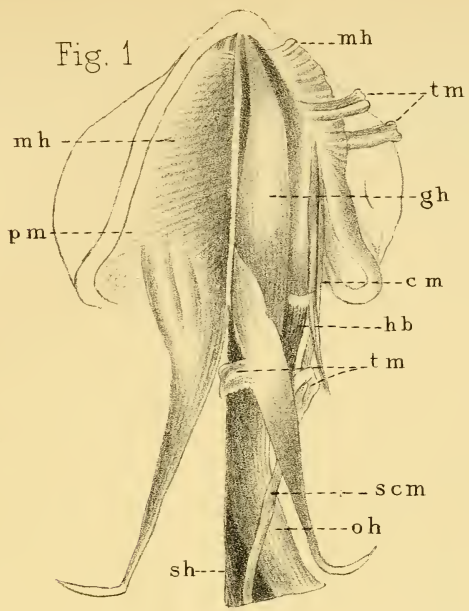
IX. OECOPHORIDAE—(Continued.)

The following additional species of *Eulechria* (besides others) were obtained since my last paper left my hands, and are therefore not included in the analytical table of that genus; but as they are closely related to the concluding species, they may be added here without disturbing the systematic arrangement. The first alone is of somewhat doubtful affinity; the second belongs to the group of *Eul. scopariella*; the remaining four form a single peculiar group, with the forewings more elongate and generally narrower than in any others. except *Eul. perditæ*.

108. *Eul. leucophanes*, n. sp.

Media, alis ant. niveis, nitidis, margine costali basim versus angustissime fusco; post. dilute albido-fuscis; thorace griseo.

♂ 17-20 mm., ♀ 24 mm. Head white, faintly ochreous-tinged, face fuscous. Palpi long, in ♀ very long, fuscous, internally and at apex of second joint whitish. Antennae fuscous, towards base whitish. Thorax pale whitish-fuscous. Abdomen ochreous whitish. Legs dark fuscous; posterior tibiæ ochreous-whitish,



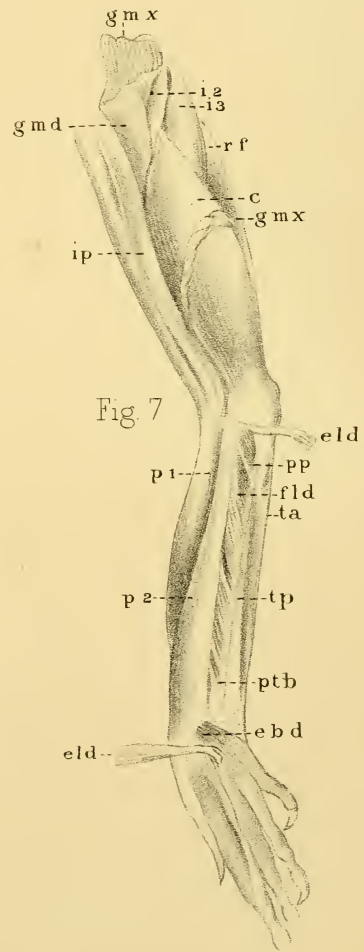
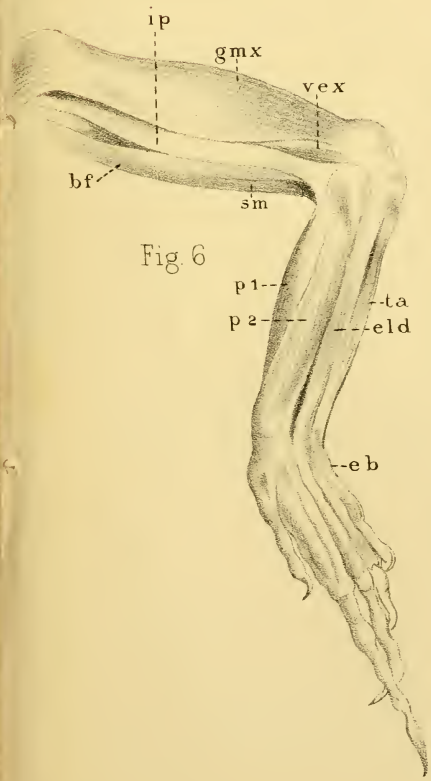
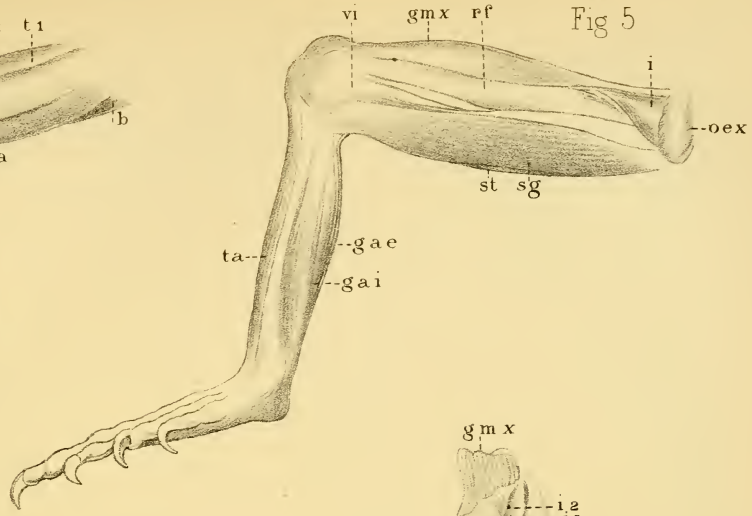
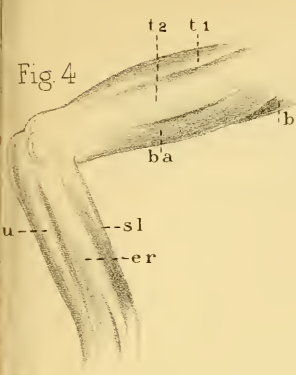


Fig. 8

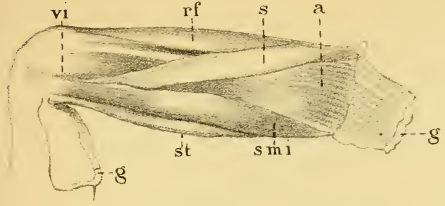


Fig. 9

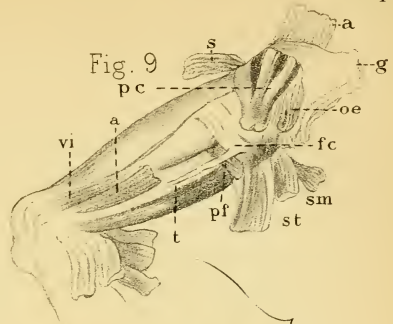


Fig. 9

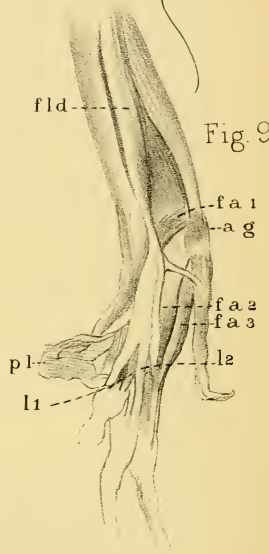


Fig. 10

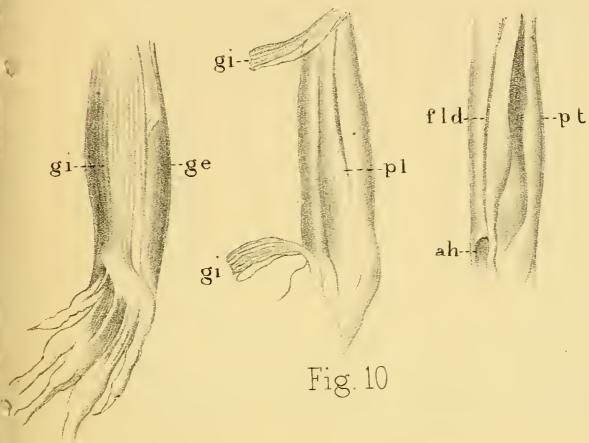


Fig. 12

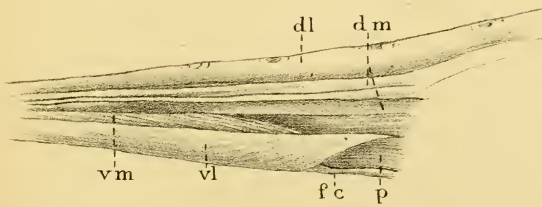


Fig. 13

